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Original Article

Spectrum of haematological neoplasms at a tertiary care hospital in Northern Province, Sri Lanka

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Abstract

Haematological neoplasms comprise a collection of heterogeneous neoplastic conditions that arise from cells of the bone marrow and lymphoid system. This study describes the pattern and distribution of haematological neoplasms at a tertiary hospital inNorthern Province,Sri Lanka.

A descriptive retrospective audit was conducted ofall haematological neoplasms diagnosed by bone marrow and peripheral blood examination.

A total of 435 haematological neoplasms were diagnosed and reported during the 4-year period. Acute myeloid leukaemia was the commonest haematological neoplasm, followed by plasma cell neoplasm myelodysplastic syndrome acute lymphoblastic leukaemia chronic myeloid leukaemia and chronic lymphocytic leuka emia. Male predominance was seen in most haematological neoplasms, compatible with local, regional, and global data. Female predilection was noted in essential thrombocythaemia, matching global trends, andin myelodysplastic syndrome, incontrast to global data.

Acute myeloid leukaemia is the most common haematological neoplasm.

Keywords

Haematological neoplasms, acute myeloid leukaemia, Jaffna

Introduction

Haematological neoplasms comprise a collection of heterogeneous neoplastic conditions that arise from cells of the bone marrow and lymphoid system. [1] These are clonal disorders derived from these cells which have undergone genetic alterations.[2] Haematological neoplasms comprise around 8% of all malignancies globally. [3] The most common forms are leukaemia, non-Hodgkin's lymphoma, multiple myeloma, and Hodgkin's lymphoma. [3, 4] With limited resources for diagnosis and treatment, haematological neoplasms constitute a significant burden to healthcare systems in resource-poor settings. [5]

Diagnosis of a haematological neoplasm relies on the availability of a number of investigations such as blood picture, bone marrow aspiration and trephine biopsy, and immunophenotyping by flowcytometry. In addition, genetic studies like cytogenetics, polymerase chain reaction, and next generation sequencing play an important role in diagnosis.[1] Even though facilities for morphological assessment are widely available, technical and financial challenges pose barriers to the use of other investigations by haematologists practicing in low-resource settings. [5]

Teaching Hospital Jaffna is a tertiary care centre in the Northern Province of Sri Lanka which serves a population of around 1.2 million. The Haematology Unit of the Teaching Hospital Jaffna is well-equipped and has facilities to perform an array of haematological investigations, except cytogenetic and molecular studies, which are outsourced as per requirement.

The Haematology Unit carries out approximately 300 bone marrow examinations in a calendar year. The unit commenced performing immunophenotyping by flowcytometry in 2016. Apart from samples from the Teaching Hospital Jaffna, the Haematology Unit also receives samples from peripheral hospitals located in the Northern Province.Since 2016, the diagnosis of haematological neoplasmsis confirmed by morphology and flowcytometry.

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This study describes the pattern and distribution of haematological neoplasms at Teaching Hospital Jaffna in northern Sri Lanka, including the frequencies of haematological neoplasms, their demographic distribution, and trends in detection rates,over a4-year period.

Materials and Methods

This was a retrospective descriptive studyof all haematological neoplasms diagnosed by bone marrow and peripheral blood examination at the Haematology Unit, Teaching Hospital Jaffna, between July 2016 and June 2020.Data on haematological neoplasms (age, sex, and diagnosis) were retrieved from the database maintained at the Haematology Unit, and analysed with SPSS (v26). Haematological neoplasms were categorised according to the ICD 11 classification (ICD-O-3 code list). Data were summarised using frequencies and percentages.

Results

In total,435 patientswere diagnosed to have haematological neoplasms during the 4-year period. The median age at diagnosis was 62 years (range 1-93 years). Just over half of the sample were male (52%, n=226) showing a slight male preponderance (male: female 1:0.9). A large majority were Sri Lankan Tamils, contributing 97% to the sample. Additionally, 77.5% of all patients were residents from Jaffna district, while the remaining cases were reported from Kilinochchi, Mannar, Mullaitivu, and Vavuniya, with a few additional cases from outside the Northern Province (Table 1).

Table 1: Demographic profile of patients (n=435)

Demographic characteristics		Frequency	Percentage
Sex	Male	226	52
	Female	209	48
Ethnicity	Sri Lankan Tamil	422	97
	Sri Lankan Muslim	12	2.7
	Sinhalese	1	0.002
District	Jaffna	337	77.5
	Kilinochchi	36	8.2
	Mullaitivu	27	6.2
	Vavuniya	16	3.6
	Mannar	14	3.2
	Other	5	1.1

When considering the number of cases by year, a higher number were observed in the latter two-year period (2018/2019 and 2019/2020) (Table 2).

Table 2: Year-wise distribution of diagnosed haematological neoplasms

Year	Frequency	Percentage
2016/2017	92	21.1
2017/2018	94	21.6
2018/2019	130	29.9
2019/2020	119	27.4

The most commonly reportedhaematological neoplasm was acute myeloid leukaemia (AML) which accounted for 21.4% (n=93), followed by plasma cell neoplasms (PCN) 19.1% (n=83) and myelodysplastic syndrome (MDS) 15.6% (n=68) (Table 3).

Table 3: Distribution of haematological neoplasms(July 2016 to June 2020)

Type of Haematological neoplasm	Frequency	Percentage
AML	93	21.4
PCN	83	19.1
MDS	68	15.6
ALL	49	11.3
CML	37	8.5
B-CLPD	22	5.1
CLL	22	5.1
ET	14	3.2
PRV	11	2.5
PMF	11	2.5
CMML	11	2.5
MPN-NOS	4	0.9
T-CLPD	4	0.9
Clonal Eosinophilia	2	0.5

The AML category included 87 AML-NOS (not otherwise specified) cases along with two cases of AML with myelodysplasia related changes, two cases of mixed phenotypic acute leukaemia -B/myeloid,and one case of myeloid leukaemia associated with Down syndrome. In AML, the

median age of diagnosis was 60 years (range 3-86) with a nearequal distribution among males and females(males: females47:46) (Table 4).

Table 4: Age and Sex distribution of haematological neoplasms

Haematological neoplasm	Median Age	Mini-mum age	Max-imum age	Sex ratio
AML	60.0	3	86	1.02
ALL	16.0	1	76	1.45
CML	52.0	27	85	1.64
PRV	70.0	55	90	10.0
ET	68.5	40	80	0.55
PMF	63.0	46	81	1.20
MPN-NOS	59.5	50	70	0.40
MDS	65.0	27	85	0.91
CMML	71.0	56	86	0.54
Clonal Eosinophilia	62.0	44	80	1.00
PCN	66.0	33	90	1.30
CLL	71.0	50	93	1.30
B-CPLD	60.0	19	74	0.69
T-CPLD	38.5	3	61	1.00

PCN consisted of 80 plasma cell myeloma cases, two solitary plasmacytomas and one case of plasma cell leukaemia. This group of neoplasms malignancies showed a clear male predominance (male: female 47:36) with a median age at diagnosis of 66 years (range 36-90 years) (Table 4).

The 68 cases of MDS included 51 cases of MDS with multi lineage dysplasia,11 MDS cases with excess blasts, four cases of unclassifiable MDS, one case ofMDS with 5q-anomaly and one case of therapy related MDS. The median age at diagnosis was 65 years (range 27-85 years)with a marked female predominance (male: female 24:44) (Table 4).

Both precursor B-cell lymphoblastic leukaemia and T-lymphoblastic leukaemia/lymphoma wereconsidered in the acute lymphoblastic leukaemia (ALL) category(11.3%, n=49). The median age at diagnosis was 16 years (range 1-76 years), with a male preponderance (male: female29:20).

The myeloproliferative neoplasms (MPN) category included chronic myeloid leukaemia (CML),polycythaemia rubravera (PRV), essential thrombocythaemia (ET), myelofibrosis (MF) and myeloproliferative neoplasm - not otherwise specified (MPN-NOS).

Among them, CML was the commonest type diagnosed during the 4-year period; 37 cases were reported with a median age of 53 years, showing male predominance (male: female =23:14).The remaining MPNs showed similar numbers of cases;14 cases of ET, 11 cases of PRV, and 11 cases of MF.The median age atpresentation was 68.5, 70, and 63years, for ET, PRV and MF, respectively.

Chronic lymphocytic leukaemia (CLL) contributed 6% of all haematological neoplasms with 26 reported cases. The median age at diagnosis was 71 years (range 50-93 years) with a slight male predominance (male: female 15:11).Lastly, 22 (5.1%) cases of B cell chronic lymphoproliferative disorders were reported with a median age at diagnosis of 60 years with a male to female ratio of 0.69 and T cell chronic lymphoproliferative neoplasms contributed only to 0.92% of all neoplasms

Discussion

To our knowledge, this is the first study of the pattern and distribution of haematological neoplasms undertaken in northern Sri Lanka.

In our study, the median age for all haematological neoplasms was 62 years, a relatively younger age compared to international data. For instance, the median age at diagnosis of haematological neoplasms in Europe and globally is in the 7th decade. [6, 7]

Male predominance was seen in most haematological neoplasms, also compatible with local, regional and global data.[4, 8, 9] A possible explanation for the male predilection may be greater exposure to occupational, environmental and other hazards during outdoor activities, compared to females. [10, 11, 12,] But this result needs further evaluation locally.

Female predilection was noted in essential thrombocythemia (ET) which matches global incidences. [3] By contrast to international data,however, our study revealed a female predominance in myelodysplastic syndrome (MDS) and B cell chronic lymphoproliferative disorders (B-CLPD).[3, 4,5] This observation also needs to be interpreted cautiously as the

unavailability of genetic studies for MDS and the diagnosis of B-CLPD being mostly made from tissue sections at the Histopathology Department, may have affected the ultimate figures.

Year wise distribution showed a marginal increase in number of haematological neoplasms over the study period, which maybe due to the greater availability of diagnostic facilities, improved access, and increased awareness among primary care physicians.While these possibilities need further exploration, the decline in diagnosed cases in the last year (July 2019 to June 2020) is probably due to the overall reduction in hospital admissions due to the covid pandemic.

The common haematological neoplasms detected in the study period (in order of percentages) were acute myeloid leukaemia (AML), plasma cell neoplasms (PCN) and myelodysplastic syndromes (MDS), corresponding to global incidence. [3, 4, 5] The most frequent neoplasm was AML,contributing 21.4%, a one fifth of all haematological neoplasms diagnosed at Teaching Hospital Jaffna. The category included AML-not otherwise specified cases, AML with myelodysplastic changes, myeloid leukaemia associated with Down syndrome and therapy related AML. Most of the cases in the present study were labelled as AML-NOS due to the unavailability of resources to perform genetic studies at the hospital. According to global data, acute leukaemia is the second most common haematological neoplasm after non-Hodgkin's lymphoma (NHL). [4,13,14] but WHO figures show that acute leukaemia is the commonest type in the Asian region including India (14). The second commonest neoplasm detected in our study was PCN. This category included mainly plasma cell myeloma, with one case of plasma cell leukaemia and two cases of solitary plasmacytoma. PCN make up 10% to 15% of all haematological neoplasms worldwide. [3] while in this study they contributed 19.1%. Median age of presentation was 66 years, in line with international data (70 years). Male predominance was observedin this study (male to female ratio 1.3:1), compatible with global incidence (1.1:1). [3]

MDS accounted for 15.6% of all haematological neoplasms in the present study. The median age of presentation was 65 years, while global data show a median age of 70 years.[3]

Chronic myeloid leukaemia (CML) comprised 8.5% of haematological neoplasmswith the median age at presentation 52 years, a much younger age in contrast to international data. [15,16,17] but consistent with data from India. [13] CML showed a slight male predilection, in line with global data.

Of the other myeloproliferative neoplasms, primary myelofibrosis showed a similar median age at presentation when compared with world figures, while for polycythaemiarubravera (PRV) and ET the median age is comparatively higher in the present study. [3] Gender predilection for ET and myelofibrosis (MF) were almost similar with WHO data. PRV was reported in 10 males while only one female was diagnosed, this finding keeps up with global data where it shows a male predominance although the ratio globally being male to female 1-2:1.[3]

Acute lymphoblastic leukaemia (ALL) consisted of B-ALL and T-ALL accounting for 11.3% of all haematological neoplasms in the study. Median age of presentation was 16 years although the age range was 1 to 76 years, consistent with international figures. [3, 4, 5] Median age of presentation for chronic lymphocytic leukaemia (CLL) was 71 years with a male predominance; both compatible with global data. [3]

NHL (B-CLPD and T-CLPD collectively) only contributed to 6% of all haematological neoplasms in this study, in stark contrast to global data and all other studies reviewed. [8, 12, 18, 19] NHL is usually diagnosed by histopathologists with a tissue diagnosis; bone marrow examination or immunophenotyping by flowcytometry are not required. This may explain the fewer number of cases reported by the Haematology Unit of Teaching Hospital Jaffna.

Collaborative studies with the Histopathology Unit are needed to describe the pattern of NHL and Hodgkin's lymphoma, which rely on tissue biopsy for diagnosis. Further studies are needed

to compare the spectrum of haematological neoplasmsin various parts of the country. A study done outside the Northern Province would be beneficial to identify geographical and ethnic variations.

The present study demonstrates that epidemiological studies can be conducted within resource limited settings, yielding valuable estimates of cancer burden.

Conclusion:

This study represents the first of its kind from a tertiary care hospital with diagnostic haematology facilities in the northern province of Sri Lanka. The study noted different patterns of occurrence of haematological neoplasms in comparison to noted incidences regionally and globally. Questions related to the pattern of haematological neoplasms, including their distribution and risk factors in other areas of the country, remain unresolved and offer interesting challenges to future researchers.

There are no conflicts of interest.

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